

REMARKS

Claims 26-32 and 43-44 have been canceled without prejudice and claims 24, 25, 34, and 39-42 have been amended. Support for these amendments can be found throughout the claims and specification as filed. For example, support may be found in the specification at page 5, lines 5-7; at page 6, lines 1-4; at page 10, line 15 through page 12, line 9; at page 29, line 25 through page 30, line 2; at page 30, lines 10-15; at page 31, lines 9 and 15; at page 32, lines 13-20; and at page 63, line 25 through page 64, line 13. No new matter has been added by way of amendment. Accordingly, claims 24, 25 and 33-42 will be pending upon entry of this amendment.

Priority

The Examiner objected to the specification as failing to comply with conditions for receiving the benefit of an earlier filing date under 35 USC §120. The Examiner points out that the application “must contain a specific reference to the prior application(s) in the first sentence of the specification or in an application data sheet...,” including the relationship (i.e. continuation, divisional, or continuation-in-part) between the applications. Applicants have amended the specification to address the Examiner’s concerns. Applicants submit that the first sentence of the specification as amended does contain specific reference to prior applications as well as indication of the relationship between the applications. Thus, Applicants respectfully request reconsideration and withdrawal of this objection.

Information Disclosure Statement

The Examiner objected to the Information Disclosure Statement as failing to comply with the provisions of 37 CFR §1.97, 1.98 and MPEP §609 “because references A9 and A12 lack sufficient description so as to lead the reader to the cited documents”. Applicants submit herewith a Supplemental Information Disclosure Statement in which Applicants provide complete descriptions for the cited information. Entry and consideration of the information cited in the enclosed Supplemental Information Disclosure Statement is respectfully requested.

Sequence Disclosures

The Examiner objected to the specification as failing to comply with the requirements of 37 CFR §1.821 through 1.825. Specifically, the Examiner objected to the specification (for example, in the Description of the Drawings) making reference to polynucleotide and polypeptide sequences without a

sequence identifier of the form: SEQ ID NO:X. To address the Examiner's concerns, Applicants have amended sequence references in the specification to properly reflect the SEQ ID NO to which they are associated. For example at page 6, Applicants have amended lines 25-26 to recite "It is predicted that amino acids 1-45 of SEQ ID NO:1 constitute the amino terminal extracellular domain..." In addition, Applicants have amended the specification to replace any sequence identifiers in the form "SEQ ID NO X" (*i.e.* those without a colon) with those of the form "SEQ ID NO:X" (*i.e.* with a colon). It is believed that the foregoing amendments overcome this objection. Thus, Applicants respectfully request reconsideration and withdrawal of the objection. However, should the Examiner be minded to maintain the objection, clarification is respectfully requested.

Objections to the Specification

The Examiner objected to the specification for missing ATCC numbers. Applicants have amended the specification to indicate the ATCC deposit number, PTA-1143, for the deposited cDNA clone.

The Examiner also objected to the specification for containing embedded hyperlinks and/or other forms of browser-executable code. Applicants have amended the specification to remove references to embedded hyperlinks and/or other forms of browser-executable code.

Upon entry of the foregoing amendments, Applicants submit that the objections to the specification are rendered moot. Applicants respectfully request reconsideration and withdrawal of these objections.

The Rejection of Claims 24-44 Under 35 USC §112, Second Paragraph, Should Be Withdrawn

Claims 24-44 were rejected by the Examiner under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, the Examiner rejected claims 24-37 and 40-44 as unclear in "what limitations are placed on the claim by the word 'modulation'". In an effort to expedite prosecution, Applicants have amended claims 24, 25, 41, and 42 to replace the term "modulates" with the phrase "stimulates or inhibits" and the term "modulation" with the phrase "stimulation or inhibition". In addition, claims 26-32 have been canceled. It is believed that these amendments render the claims clear under 35 USC §112, second paragraph.

Additionally, the Examiner also rejected claims 24, 25, and 33-42 as being unclear in the phrase "14273 polypeptide activity". In an effort to expedite prosecution, Applicants have amended claims 24,

25, 41 and 42 to replace the phrase “14273 polypeptide activity” (*e.g.* in the case of claim 24) with the phrase “activity of a polypeptide comprising the amino acid sequence of SEQ ID NO: 1 or 4.” In addition, claims 24, 25, 41 and 42 have been amended to specify this activity as

“selected from the group consisting of:

- 1) binding to a G protein in response to ligand binding;
- 2) receptor protein phosphorylation in response to ligand binding;
- 3) binding to a ligand;
- 4) modulation of intracellular calcium concentration;
- 5) modulation of intracellular cAMP concentration;
- 6) modulation of adenylate cyclase activity; and
- 7) modulation of phospholipase C activity,”

In addition, claims 26-32 have been canceled. Applicants submit that the foregoing amendments render claims 24, 25, and 33-42 clear under 35 USC §112, second paragraph. Reconsideration and withdrawal of the rejection is respectfully requested.

The Rejection of Claims 24-44 Under 35 USC §101 Should Be Withdrawn

Claims 24-44 were rejected by the Examiner under 35 USC §101 as not being supported by either a specific and substantial asserted utility or a well-established utility.

The Examiner argued:

“the instant claims are directed to methods which simply invite the artisan to embark on a research plan to try to determine what activities the 14273 polypeptide might have and if there might be an activity that is relevant to cardiac hypertrophy. The instant specification puts forth that the polypeptide is useful in a screening method to determine what ligands may activate or inhibit the polypeptide and also to determine what the physiological effects of the polypeptide might be (see pages 5, 10, 30-34). This proposed use lacks a specific and substantial utility. It is not specific because any integral membrane protein could be used in exactly the same way.”

The Examiner further argued that “the proposed use of the polypeptide to screen for ligands of the polypeptide or for biologic effects of the polypeptide is not a substantial utility.”

Applicants respectfully traverse the rejection and submit that at least one disclosed utility for the claimed methods which is specific and substantial is in fact set forth in the specification.

First, the 14273 molecule of the claimed methods is specifically identified as the polypeptide set forth in SEQ ID NO:1 or 4, and the polypeptide encoded by the nucleotide sequence contained in the

plasmid deposited with ATCC as accession number PTA-1143. Therefore, the claimed methods of identifying compounds which stimulate or inhibit a specific receptor, namely the 14273 receptor, are methods that are specific and not applicable to the general class of receptors, nor to "any integral membrane protein."

Second, the 14273 molecule is identified in the specification (for example, at page 10, line 15 through page 12, line 9; and at page 32, line 13-20) as a GPCR with the following specific biological activities:

- 1) binding to a G protein in response to ligand binding;
- 2) receptor protein phosphorylation in response to ligand binding;
- 3) binding to a ligand;
- 4) modulation of intracellular calcium concentration;
- 5) modulation of intracellular cAMP concentration;
- 6) modulation of adenylate cyclase activity; and
- 7) modulation of phospholipase C activity.

Therefore, the activities attributed to the molecule of the claimed invention are specific and are not applicable to "any integral membrane protein."

Furthermore, Applicants teach that the 14273 receptor is involved in cardiovascular disease, such as cardiomyopathy and cardiac hypertrophy. In particular, at page 5, lines 4-7; and at page 29, lines 2-5 of the specification, Applicants teach that the 14273 receptor is expressed in cardiac myocytes, and in fact is upregulated in hypertrophic cardiac myocytes versus normal cardiac myocytes. In addition, the specification at page 6, lines 1-11; at page 29, line 25 through page 30, line 2; at page 30, lines 10-15; and at page 31, lines 4-16; teaches that methods utilizing the 14273 polypeptides may be used to identify compounds which stimulate or inhibit the activity of the 14273 receptor, and that these methods are useful in identifying compounds that can be used to treat cardiovascular disease (such as cardiac hypertrophy) or diseased tissue (such as hypertrophic cardiac myocytes). Thus, the claimed methods assert utilities based on a specific receptor, with specific activities, that has a relationship to specified diseases set forth in the specification as filed.

Applicants submit the utilities set forth for identification of compounds which stimulate or inhibit the polypeptide activity of the 14273 receptor are also substantial utilities, since the methods would identify compounds that themselves have a substantial utility, (e.g. in treatment of a well-known, specified disease such as cardiac hypertrophy, which constitutes a real world use). Thus, in contrast to the Examiner's assertions, Applicants submit a utility specific and substantial for the claimed methods of screening for stimulators or inhibitors of 14273 polypeptide activity has in fact been asserted.

In addition, Applicants submit that the identity of the natural ligand, interacting G-proteins, or even particular activities of the 14273 receptor proteins described in the instant specification are not

requisite for the asserted utilities to be specific or substantial. For example, one of skill in the art could use the 14273 molecules of the present invention to screen for modulators (in a manner in accordance with the teachings set forth in the specification at page 31, lines 4-16) *without* the knowledge of the natural ligand, interacting G-proteins, or other signaling events, as described in, at least, U.S. Patent No. 6,110,693; Silverman *et al.* (1998) *Curr Opin Chem Biol* 2:397-403; and Barak *et al.* (1997) *J Biol Chem* 272(44): 27497-27500 (provided herewith as Supplemental IDS citations Nos. A18, B9, and B10, respectively). For example, Barak *et al.* teach a method to interrogate GPCR signaling behavior by monitoring β -arrestin2-GFP translocation, which can be performed without individualized assays, nor prior knowledge of endogenous ligands or other signaling events (see especially next-to-last paragraph on page 27500). Barak *et al.* state that

“since GPCR activation ultimately terminates with the association of β -arrestin and receptor, a convergent step of the GPCR signal transduction paradigm, the cellular visualization of the agonist-mediated translocation of β arr2-GFP provides a universal measure for detecting the activation of unknown GPCRs.”

Thus, Applicants submit that the utility of the claimed methods of the invention is specific and substantial, as contrary to the Examiner's opinion, it does not require undue further experimentation.

Applicants submit the utility of screening methods for identification of therapeutics is an accepted substantial and real world utility in the pharmaceutical industry. Still further, the Office recognizes that intermediate, or research tool utilities can and do satisfy the Utility requirement. For example, MPEP §2107.01, section addressing research tools:

“Some confusion can result when one attempts to label certain types of inventions as not being capable of having a specific and substantial utility based on the setting in which the invention is to be used. One example is inventions to be used in a research or laboratory setting. Many research tools such as gas chromatographs, screening assays, and nucleotide sequencing techniques have a clear, specific and unquestionable utility (e.g., they are useful in analyzing compounds).” (emphasis added)

Even assuming *arguendo* that the Examiner has made a proper rejection, Applicants submit that the relevant evidence weighs in favor of supporting Applicants' asserted utility. For example, in the instant specification at page 5, lines 4-7, and at page 29, lines 2-5, Applicants point out that the 14273 molecule is expressed in cardiac myocytes, and in fact is upregulated in hypertrophic cardiac myocytes versus normal cardiac myocytes. In addition, the specification at page 12, line 27 through page 13, line 29, teaches that 14273 maps to a region in chromosome 10q21-10q23 which is the locus for a pure autosomal dominant familial dilated cardiomyopathy, the region being defined as “cardiomyopathy

dilated 1C". Furthermore, Applicants point to U.S. Patent Serial No. 6,448,005, included herewith as Supplemental IDS citation No. A19, which describes transgenic mice that express the 14273 receptor specifically in the heart and which develop cardiac hypertrophy, where receptor mRNA and protein levels correlated with the severity of the phenotype. This further supports the asserted utility of the claimed screening methods in the present invention. Thus, the evidence weighs in favor of Applicants' assertion of utility in the instant application. As such, maintenance of the utility rejection as not specific and not substantial is improper.

The Examiner also points to the disclosure that the gene encoding the 14273 receptor maps to a region associated with dilated cardiomyopathy (10q21-23). The Examiner takes the position that this "merely defines a starting point for further research and investigation to search for an activity and then to search for an actual relationship". Specifically, the Examiner argues that

"One of ordinary skill in the art appreciates that many different diseases are also associated with 10q21-23. For example, Bowles et al., *Human Genetics* 105(6)582-6, 1999, reported that human peptidyl-prolyl-cis-trans-isomerase mitochondrial precursor gene maps to this same region but is not a cause of dilated cardiomyopathy (see the Abstract). Therefore, the information provided in the specification amount to no more than an invitation to one of skill in the art to perform research and investigation into any possible role the activity may have in disease."

Applicants respectfully traverse this rejection on the grounds that the Examiner has mischaracterized Bowles *et al.* Specifically, Bowles *et al.* *do not* report that the human peptidyl-prolyl-cis-trans-isomerase mitochondrial precursor (PPIF) gene is not a cause of dilated cardiomyopathy, as suggested by the Examiner. Rather, Bowles *et al.* teach that the PPIF gene is not the cause of dilated cardiomyopathy *in the one family* that was tested (see last line of the abstract). However, Bowles *et al.* state "**PPIF should remain a candidate gene for other chromosome 10-linked cases of FDCM [familial dilated cardiomyopathy]**" (emphasis added) (see last three lines of the conclusion at page 585).

Thus, the teachings of Bowles *et al.* further support Applicants' arguments that the mapping of a gene to a specific genetic location corresponding to 10q23.1-23.3, would lead a skilled artisan to conclude that *more likely than not* the gene is associated with dilated cardiomyopathy.

In order to rebut an asserted utility, an Examiner must *make a prima facie showing of no specific and substantial credible utility and the Examiner must establish that it is more likely than not that a person skilled in the art would not consider credible any specific and substantial utility asserted by the applicant for the claimed invention.* See MPEP 2107 II (C).

Applicants submit that the Examiner has not met the burden of making a sufficient showing to establish that the utility set forth in the present specification would not be specific and

substantial, as sufficient support or factual findings have not been relied upon to make such a showing to rebut Applicants' assertion that the use in identification of therapeutics would, more likely than not, be useful. Rather, the Examiner relies on general arguments to back up his claim that Applicants' original asserted utility is not specific or substantial.

Based on the foregoing remarks and arguments, as well as the ample teachings in Applicants' specification, Applicants submit the Examiner has not met the requirement to rebut Applicants' asserted utility – no evidence specific to demonstrate Applicants' asserted utility is inoperative, not useful, or contradictory to scientific principles has been presented. Therefore, Applicants respectfully believe the Examiner's imposition of the present rejection is improper in view of the utility guidelines and MPEP §2701, and as such the rejection of claims 24-44 under 35 USC §101 should be withdrawn.

**The Rejection of Claims 24-44 Under 35 USC §112, First Paragraph (Enablement),
Should Be Withdrawn**

The Examiner rejected claims 24-44 under 35 USC §112 first paragraph, as failing to satisfy the utility requirement. For the reasons discussed above, Applicants submit the utility requirement has been met and respectfully request reconsideration and withdrawal of the rejection under 35 USC §112, first paragraph.

The Examiner also rejected claims 24-44 under 35 USC §112 first paragraph, as failing to satisfy the enablement requirement. Specifically, the Examiner argues that the

“Applicant has not provided sufficient guidance as to how to make and use the methods commensurate with the scope that is claimed for the following reasons:

First, claim 27 requires that the activity be G-protein phosphorylation, the specification does not appear to contemplate such and neither would such be expected; rather it is probably Applicant's intention that the activity be 14273 polypeptide phosphorylation, i.e., it is commonly accepted that the GPCR and not the G-protein is phosphorylated.

Second, the claims require that the methods be practiced under conditions suitable for modulation of the 14273 activity. As it is commonly understood, the activity of a GPCR is induced by binding to an external ligand, yet no ligand has been identified by the specification. It is well established that it may take years of intensive trial and error experimentation to find a ligand for a GPCR. Nor has the specification taught what G-protein(s) couple to the receptor, or what fragments provide any activity, and nor has the specification taught what particular activities could be detected. The specification has merely provided a generalized list of activities that certain GPCRs have been shown to have. No particular activities are asserted to be associated with the 14273 receptor activity. Thus the artisan is left to perform extensive trial and error

research and investigation in the hope of finding a ligand, finding a G-protein, and finding a specific activity that can be measured.”

Applicants traverse the foregoing rejection for the following reasons, addressing the concerns of the Examiner in order:

First, in order to expedite prosecution, Applicants have canceled claim 27. Thus, it is believed that the rejection of claim 27 under 35 USC §112 first paragraph is now moot.

Second, the Examiner argued that “no ligand has been identified by the specification...nor has the specification taught what G-protein(s) couple to the receptor, or what fragments provide any activity, and nor has the specification taught what particular activities could be detected.”

Applicants traverse the rejection and respectfully submit that contrary to the Examiner's assertion, the identity of the natural ligand or interacting G-proteins of the 14273 receptor proteins described in the instant specification are not requisite to practice the claimed invention. For example, one of skill in the art could use the 14273 molecules of the present invention to screen for modulators (in a manner in accordance with the teachings set forth in the specification at page 31, lines 4-16) *without* the knowledge of the natural ligand, interacting G-proteins, or other signaling events, as described in, at least, U.S. Patent No. 6,110,693; Silverman *et al.* (1998) *Curr Opin Chem Biol* 2:397-403; and Barak *et al.* (1997) *J Biol Chem* 272(44): 27497-27500 (provided herewith as Supplemental IDS citations Nos. A18, B9, and B10, respectively). For example, Barak *et al.* teach a method to interrogate GPCR signaling behavior by monitoring β -arrestin2-GFP translocation, which can be performed without individualized assays, nor prior knowledge of endogenous ligands or other signaling events (see especially next-to-last paragraph on page 27500). Barak *et al.* state that

“since GPCR activation ultimately terminates with the association of β -arrestin and receptor, a convergent step of the GPCR signal transduction paradigm, the cellular visualization of the agonist-mediated translocation of β arr2-GFP provides a universal measure for detecting the activation of unknown GPCRs.”

Thus, Applicants submit, contrary to the Examiner's assertion, that one of skill in the art could practice the claimed invention without the need to perform undue experimentation as Applicants have established that practice of the claimed invention does not require the identity of the natural ligand nor the G-protein coupling to the 14273 receptor, and therefore, the specification is enabling for practice of the claimed invention.

While Applicants submit that the specification provides ample teachings regarding the structure/function relationship of the 14273 receptor, the claimed methods are not drawn to fragments of

the 14273 polypeptide, and therefore the rejection on the basis of what fragments provide activity is moot. The claimed methods using the full-length 14273 polypeptides described are fully enabled by the specification as filed.

The Examiner further argues that, in the instant specification, "No particular activities are asserted to be associated with the 14273 receptor activity." Applicants submit that the specification does indeed disclose particular activities which are associated with the 14273 receptor. For example, at page 10, line 15 through page 12, line 9; at page 32, lines 13-20; as well as in the claims as filed, the specification teaches that the 14273 receptor protein is a GPCR and that the 14273 protein 1) modulates intracellular calcium concentration, 2) modulates intracellular cAMP concentration, 3) modulates phosphatidylinositol metabolism, 4) modulates adenylate cyclase activity, 5) modulates phospholipase C activity, 6) binds ligand, and 7) phosphorylates itself or other receptor protein targets. Thus, Applicants submit that the specification does teach particular activities associated with the 14273 receptor protein described in the specification, and that the scope of these activities is not indeterminately large as stated by the Examiner. Furthermore, as described above, the teachings of Barak *et al.* demonstrate that knowledge of even particular activities of a given GPCR are not requisite to practice a screening method identifying compounds which modulate the GPCR.

Applicants respectfully submit, in view of the foregoing amendments and remarks, that the rejection of claims 24-44 under 35 USC §112 first paragraph (enablement) is improper, as the specification is enabling for a person of ordinary skill in the art to make and use the claimed invention commensurate with the scope of the claims as amended. Applicants respectfully request reconsideration and withdrawal of this rejection.

**The Rejection of Claims 24-44 Under 35 USC §112, First Paragraph (Written Description),
Should Be Withdrawn**

Claims 24-44 were rejected by the Examiner under 35 USC §112, first paragraph, as failing to comply with the written description requirement. The Examiner states that the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, the Examiner argued that

"The claims require that the methods be practiced under conditions suitable for modulation of the 14273 activity. As it is commonly understood, the activity of a GPCR is induced by binding to an external ligand, yet no ligand has been identified by the specification. It is well established that it may take years of intensive trial and error experimentation to find a

ligand for a GPCR. Nor has the specification taught what G-protein(s) couple to the receptor, or what fragments provide any activity, and nor has the specification taught what particular activities could be detected. The specification has merely provided a generalized list of activities that certain GPCRs have been shown to have. No particular activities are asserted to be associated with the 14273 receptor activity. Thus one skilled in the art would not recognize that applicant was in possession of these fundamentals, enumerated above, required to practice the claimed invention.”

Applicants respectfully traverse the rejection on the grounds that, contrary to the Examiner's assertion, the identity of the natural ligand or interacting G-proteins of the 14273 receptor proteins described in the instant specification are not requisite to practice the claimed invention. As discussed above, one of skill in the art could use the 14273 molecules of the present invention to screen for modulators (in a manner in accordance with the teachings set forth in the specification at page 31, lines 4-16) *without* the knowledge of the natural ligand, interacting G-proteins, or other signaling events, as described in, at least, U.S. Patent No. 6,110,693; Silverman *et al.* (1998) *Curr Opin Chem Biol* 2:397-403; and Barak *et al.* (1997) *J Biol Chem* 272(44): 27497-27500 (provided herewith as Supplemental IDS citations Nos. A18, B9, and B10, respectively). For example, Barak *et al.* teach a method to interrogate GPCR signaling behavior by monitoring β -arrestin2-GFP translocation, which can be performed without individualized assays, nor prior knowledge of endogenous ligands or other signaling events (see especially next-to-last paragraph on page 27500). Barak *et al.* state that

“since GPCR activation ultimately terminates with the association of β -arrestin and receptor, a convergent step of the GPCR signal transduction paradigm, the cellular visualization of the agonist-mediated translocation of β arr2-GFP provides a universal measure for detecting the activation of unknown GPCRs.”

Thus, Applicants submit that practice of the claimed invention does not require the identity of the natural ligand or of what G-proteins couple to the 14273 receptor.

While Applicants submit that the specification provides ample teachings regarding the structure/function relationship of the 14273 receptor, the claimed methods are not drawn to fragments of the 14273 polypeptide, and therefore the rejection on the basis of what fragments provide activity is moot. The claimed methods using the full-length 14273 polypeptides are fully and sufficiently described by the instant specification.

The Examiner further argues that, in the instant specification, “No particular activities are asserted to be associated with the 14273 receptor activity.” Applicants submit that the specification does indeed disclose particular activities to be associated with the 14273 receptor. For example, at page 10, line 15 through page 12, line 9; at page 32, lines 13-20; as well as in the claims as filed, the specification teaches that “the 14273 receptor protein is a GPCR” and that the 14273 protein 1) modulates intracellular

calcium concentration, 2) modulates intracellular cAMP concentration, 3) modulates phosphatidylinositol metabolism, 4) modulates adenylate cyclase activity, 5) modulates phospholipase C activity, 6) binds ligand, and 7) phosphorylates itself or other receptor protein targets. Furthermore, as described above, the teachings of Barak *et al.* demonstrate that knowledge of even particular activities of a given GPCR are not requisite to practice a screening method identifying compounds which modulate the GPCR.

Thus, Applicants submit that the specification is sufficiently descriptive in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicants respectfully request reconsideration and withdrawal of the rejection of claims 24-44 under 35 USC §112, first paragraph (written description).

CONCLUSIONS

In view of the amendments and remarks herein, Applicants respectfully submit that the objections and rejections presented by the Examiner are now overcome and that this application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned.

This paper is being filed timely as a request for a three month extension of time is filed concurrently herewith. No additional extensions of time are required. In the event any additional extensions of time are necessary, the undersigned hereby authorizes the requisite fees to be charged to Deposit Account No. 501668.


Entry of the remarks made herein is respectfully requested.

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Respectfully submitted,

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Limited Recognition under 37 CFR §11.9(b)

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